

509,212  
Rec'd PCT/PTO 24 SEP 2004

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
23 October 2003 (23.10.2003)

PCT

(10) International Publication Number  
WO 03/087178 A1

(51) International Patent Classification<sup>7</sup>: C08F 210/02,  
212/00, 8/00

(US). UELIGGER, Steven, M. [US/US]; 2840 Remington, Angleton, TX 77515 (US).

(21) International Application Number: PCT/US03/10844

(74) Agent: SPENCER, Lee; The Dow Chemical Company, Intellectual Property, B-1211, 2301 Brazosport Blvd., Freeport, TX 77541 (US).

(22) International Filing Date: 9 April 2003 (09.04.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 60/372,495 12 April 2002 (12.04.2002) US

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, YU, ZA, ZM, ZW.

(71) Applicant (*for all designated States except US*): DOW GLOBAL TECHNOLOGIES INC. [US/US]; Washington Street, 1790 Building, Midland, MI 48674 (US).

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): ROSEN, Robert, K. [US/US]; Post Office Box 547, Lafayette, CA 94549 (US). KARJALA, Teresa [US/US]; 56 Mandevilla Court, Lake Jackson, TX 77566 (US). YALVAC, Selim [US/US]; 210 Teakwood, Lake Jackson, TX 77566 (US). CHEUNG, Yunwa, W. [US/US]; 104 Rosemary Lane, Lake Jackson, TX 77566 (US). GUEST, Martin, J. [GB/DE]; Ringstrasse 9, 77836 Rheinmunster (DE). KOLTHAMMER, Brian, W.S. [CA/US]; 109 Rosewood, Lake Jackson, TX 77566

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LOW MOLECULAR WEIGHT COPOLYMER OF ETHYLENE AND VINYL AROMATIC MONOMER AND USES THEREOF

(57) Abstract: An article of manufacture comprises a copolymer of ethylene and vinyl aromatic monomer having a molecular weight of less than 15,000. Preferably, the copolymer is characterized by a backbone having a first and second terminal end group, the first terminal end group is a methyl group, the second terminal end group is a vinyl group, wherein the ratio of the terminal methyl group to the terminal vinyl group is 0.8:1 to 1:0.8. The article of manufacture includes, but is not limited to, waxes, lubricants, additives, etc. The waxes may be used to formulate paints and coatings, printing inks, carbon paper, photo toners, building and construction materials, mold release agents, hot melt adhesives, candles. The waxes may also be used in wood processing, metal working, powder metallurgy and sintering, wax modeling, sizing, crop protection, and so on.

Best Available Copy

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 03/10844A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 C08F210/02 C08F212/00 C08F8/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C08F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

PAJ, WPI Data, EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 727 446 A (IDEMITSU KOSAN CO., LTD.) 21 August 1996 (1996-08-21) page 4, line 14 - page 5, line 36 page 7, line 21 - line 59 page 26, line 38 - line 44; claims 1-5 ---	1-4
X	EP 0 896 983 A (MITSUI CHEMICALS, INC.) 17 February 1999 (1999-02-17) the whole document ---	1,4
X	DE 198 50 243 A (BASF COATINGS AG) 11 May 2000 (2000-05-11) the whole document ---	1,5
X	US 3 271 121 A (D. W. YOUNG) 6 September 1966 (1966-09-06) the whole document ---	1
	--- -/--	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*&amp;\* document member of the same patent family

Date of the actual completion of the international search

24 July 2003

Date of mailing of the international search report

05/08/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Permentier, W

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 03/10844

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 194 114 B1 (H. TOYODA) 27 February 2001 (2001-02-27) cited in the application column 4, line 20 - line 62; claims 1-8 ---	1-15
Y	WO 00 46258 A (THE DOW CHEMICAL COMPANY) 10 August 2000 (2000-08-10) page 6, line 6 -page 7, line 4 page 11, line 30 -page 18, line 21 page 19, line 4 - line 20 page 20, line 29 -page 21, line 12; claims 1-21 ---	1-15
Y	WO 01 98377 A (BASF AG) 27 December 2001 (2001-12-27) the whole document ---	1-15
Y	WO 89 12651 A (MOBIL OIL CORPORATION) 28 December 1989 (1989-12-28) claims 1-26 ---	1-15
A	FR 914 371 A (STANDARD OIL DEVELOPMENT) 7 October 1946 (1946-10-07) the whole document ---	1
A	WO 98 09999 A (THE DOW CHEMICAL COMPANY) 12 March 1998 (1998-03-12) page 6, line 9 -page 8, line 19; claims 1-12 ---	1
A	FR 1 480 529 A (CHEMISCHE WERKE HÜLS AG) 12 May 1967 (1967-05-12) the whole document ---	1,12
A	EP 0 373 879 A (MITSUBISHI RAYON CO., LTD.) 20 June 1990 (1990-06-20) claims 1-7 ---	1,6,13
A	DATABASE WPI Section Ch, Week 198447 Derwent Publications Ltd., London, GB; Class A17, AN 1984-290773 XP002248936 & JP 59 045308 A (MITSUBISHI CHEM. IND. LTD.), 14 March 1984 (1984-03-14) abstract ---	1,15
A	WO 99 20691 A (THE DOW CHEMICAL COMPANY) 29 April 1999 (1999-04-29) page 4, line 42 -page 6, line 26 page 7, line 1 - line 36 page 15, line 13 - line 41; claims 1-19 -----	1,15

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/10844

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 727446	A	21-08-1996	DE 69425900 D1 DE 69425900 T2 EP 0727446 A1 JP 3363904 B2 US 5955557 A WO 9511931 A1 US 6169154 B1	19-10-2000 01-02-2001 21-08-1996 08-01-2003 21-09-1999 04-05-1995 02-01-2001
EP 896983	A	17-02-1999	JP 10273508 A EP 0896983 A1 US 6133490 A CA 2247937 A1 WO 9833852 A1	13-10-1998 17-02-1999 17-10-2000 06-08-1998 06-08-1998
DE 19850243	A	11-05-2000	DE 19850243 A1 AU 1265800 A BR 9914896 A WO 0026312 A1 EP 1131384 A1 JP 2002528628 T	11-05-2000 22-05-2000 17-07-2001 11-05-2000 12-09-2001 03-09-2002
US 3271121	A	06-09-1966	NONE	
US 6194114	B1	27-02-2001	JP 11084721 A	30-03-1999
WO 0046258	A	10-08-2000	WO 0046258 A1 AU 2563599 A EP 1153044 A1 JP 2002536469 T	10-08-2000 25-08-2000 14-11-2001 29-10-2002
WO 0198377	A	27-12-2001	WO 0198377 A2 EP 1297025 A2 US 2003114603 A1	27-12-2001 02-04-2003 19-06-2003
WO 8912651	A	28-12-1989	US 4943383 A AT 141623 T AU 619317 B2 AU 3855089 A DE 68927007 D1 DE 68927007 T2 EP 0427742 A1 JP 2850147 B2 JP 3505341 T WO 8912651 A2	24-07-1990 15-09-1996 23-01-1992 12-01-1990 26-09-1996 23-01-1997 22-05-1991 27-01-1999 21-11-1991 28-12-1989
FR 914371	A	07-10-1946	BE 471977 A BE 472003 A	
WO 9809999	A	12-03-1998	AT 237649 T AU 4181097 A BR 9711675 A CN 1232476 A ,B DE 69721013 D1 EP 0923612 A2 JP 2001500180 T TW 473503 B WO 9809999 A2 ZA 9707907 A	15-05-2003 26-03-1998 02-01-2002 20-10-1999 22-05-2003 23-06-1999 09-01-2001 21-01-2002 12-03-1998 03-03-1999

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/10844

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 1480529	A	12-05-1967	DE 1301092 B BE 681775 A GB 1140516 A	14-08-1969 31-10-1966 22-01-1969
EP 373879	A	20-06-1990	JP 2157851 A JP 2735847 B2 DE 68923259 D1 DE 68923259 T2 EP 0373879 A2 US 5009978 A	18-06-1990 02-04-1998 03-08-1995 09-11-1995 20-06-1990 23-04-1991
JP 59045308	A	14-03-1984	NONE	
WO 9920691	A	29-04-1999	AT 229055 T AU 749315 B2 AU 1111299 A BR 9813095 A CA 2306389 A1 CN 1276815 T DE 69809968 D1 DE 69809968 T2 EP 1045882 A1 HU 0004035 A2 JP 2001520295 T NO 20001939 A PL 340395 A1 TR 200001044 T2 TW 387910 B WO 9920691 A1 US 6512049 B1 US 2002130453 A1 US 6479594 B1 ZA 9809553 A	15-12-2002 20-06-2002 10-05-1999 22-08-2000 29-04-1999 13-12-2000 16-01-2003 28-05-2003 25-10-2000 28-03-2001 30-10-2001 19-06-2000 29-01-2001 23-07-2001 21-04-2000 29-04-1999 28-01-2003 19-09-2002 12-11-2002 20-04-2000